

# ONKYO® SERVICE MANUAL

## COMPACT DISC PLAYER

### MODEL DX-788F

#### Black and Silver models

BUDN, BUD	120V AC, 60 Hz
BUP	230V AC, 50Hz
BUW	120/220V AC, 50/60Hz
BUQA	240V AC, 50 Hz

#### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

#### SPECIFICATIONS

Signal readout system:	Optical non-contact
Reading rotation:	About 500~200r.p.m. (constant linear velocity)
Linar velocity:	1.2~1.4m/s
Error correction system:	Cross interleave reedsolomon code
D/A converter:	1bit PDM×2 Accu Pulse Quartz
Sampling frequency:	352.8kHz (8 times oversampling)
Number of channels:	2 (Stereo)
Frequency response:	2Hz~20kHz
Total harmonic distortion:	0.0015% (at 1kHz)
Dynamic Range:	100dB
Signal to noise ratio:	102dB
Channel separation:	102dB (at kHz)
Wow and Flutter:	Below threshold of measurability
Power consumption:	34 watts
Output level:	2 volts r.m.s.
Dimensions (W×H×D) :	455×130×364mm
Weight:	17-15/16"×5-1/8"×14-5/16" 8.9kg, 19.6lbs

Specifications are subject to change without notice.

**ONKYO**  
**AUDIO COMPONENTS**

## SERVICE PROCEDURES

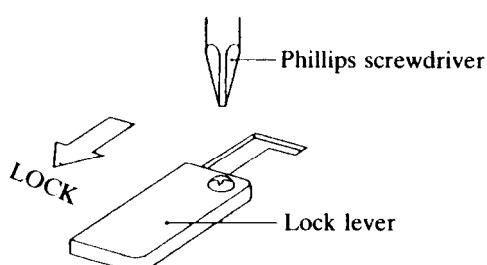
### 1. How to Release the Transport Lock

To protect the optical assembly including the laser pickup from vibration related damage during shipping, this unit is equipped with a transport lock lever located on the base.

1. Loosen the screw with Phillips screwdriver.
2. Move the lock lever in the direction opposite that shown by the arrow. Move the lever up to the position where it can move no farther, and then remove the lever.

#### ■ Tighten the screw to secure the lock lever.

- For shipping, restore the lock lever to its position in the direction of the arrow, then tighten down the screw to secure the lock lever in that position.



### 2. Use of batteries

- The remote control transmitter is powered by two batteries. Before using this unit for the first time, insert the two batteries (included).
- Average battery life is about one year. This period may be shorter depending on the frequency of use and environment (temperature and humidity) in which the remote control transmitter is used.

- If the remote control transmitter does not operate even though front panel controls function normally, the batteries should be replaced. Use only listed in the following chart.

Type	Voltage	Size
Manganese	1.5V	AA R6 UM-3

### 3. Safety check out

After correcting the original service problem, perform the following safety check before releasing the set to the customer:

Connect the insulating-resistance tester between the plug of power supply cable and chassis.

Specifications: more than 10Mohm at 500V.

### 4. Voltage selector (rear panel)

Worldwide models are equipped with a voltage selector to conform with local power supplies. Be sure to set this selector to match the voltage of the power supply in your area before turning the power switch on. Voltage is changed by turning the voltage selector with a screwdriver or similar instrument to the 120V or 220V position. Confirm that the selector has been set to the correct position before turing the power switch on. If there is no voltage selector switch on the unit you have purchased, it can only be used in areas where the power supply voltage is the same as that of the unit.

# PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

## WARNING!!

WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.

## LASER WARNING LABELS

The label shown below are affixed.

### 1. Warning label

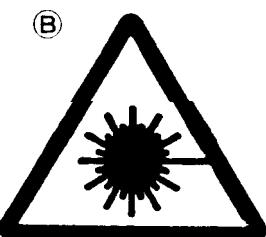
These labels are located on the rear panel and the arm of the mechanism.

(A)

**DANGER** —INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCK FAILED OR DEFEATED. AVOID DIRECT EXPOSURE TO BEAM

**CAUTION** —HAZARDOUS LASER AND ELECTROMAGNETIC RADIATION WHEN OPEN AND INTERLOCK DEFECTED

**ATTENTION** —RAYONNEMENT LASER ET ELECTROMAGNETIQUE DANGEREUX SI OUVERT AVEC L'ECLENCHEMENT DE SECURITE ANNULE.



(C)

ADVARSEL: USYNLIG LASERSTRÅLING VED ÅBNING, NÅR SIKKERHEDSBRYDER ER UDE AF FUNKTION.  
UNDGÅ UDSETTELSE FOR STRÅLING.

(D)

VARO!  
AVATTAessa JA SUOJALUKITUS OHITTETTAessa  
OLET ALTTINA NÄKYMÄTTÖMÄLLE  
LASERSÄTEILYLLÉ. ÄLÄ KATSO SÄTEESEEN.

(E)

VARNING  
OSYNLIG LASERSTRÅLLNING NÄR DENNA DEL  
ÄR ÖPPNAD OCH SPÄRREN ÄR URKOPPLAD.  
BETRAKTA EJ STRÅLEN.

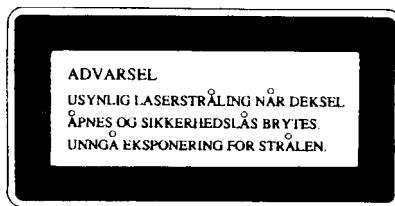
- (A) : Danger label
- (B) : Except 120V model
- (C) : Except 120V model
- (D),(E),(F) : Only 230V model

### Laser Diode Properties

- Material: GaAs/GaAlAs
- Wavelength: 780nm
- Emission Duration: continuous
- Laser output: max. 0.5mW\*

\*This output is the value measured at a distance about 1.8mm from the objective lens surface on the Optical Pick-up Block.

(F)



### 2. Certification label (120V model)

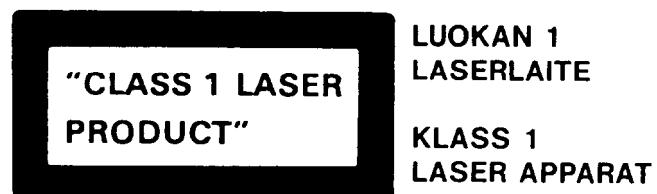
This label is located on the back panel.

PRODUCT IS CERTIFIED BY THE MANUFACTURER TO COMPLY WITH DHHS RULES 21 CFR SUBCHAPTER J APPLICABLE AT THE DATE OF MANUFACTURE.

MANUFACTURED

### 3. Class 1 label (Except 120V model)

This label is located on the back panel.



ADVARSEL

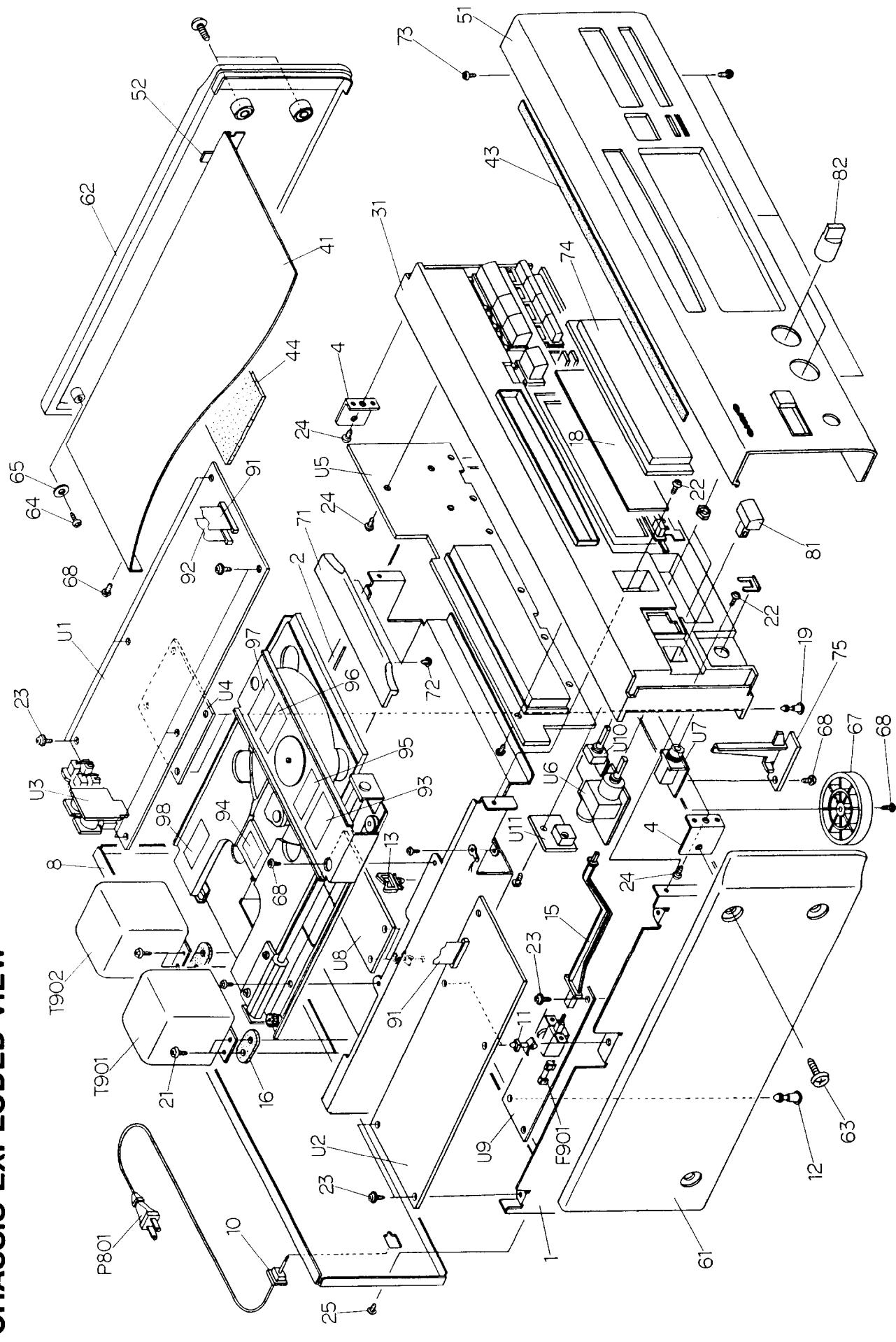
Denna mærkning er anbragt på apparatets højre side og indikerer, at apparatet arbejder med laserstråler af klasse 1, hvilket betyder, at der anvendes laserstråler af svageste klasse, og at man ikke på apparatets yderside kan blive utsat for utiladelig kraftig stråling.

APPARATET BØ/R KUN ÅBNES AF FAGFOLK MED SÉ RLIGT KENDSKAB TIL APPARATER MED LASERSTRÅLERI

Indvendigt i apparatet er anbragt den her gengivne advarselsmærkning, som advarer imod at foretage sådanne indgreb i apparatet, at man kan komme til at udsætte sig for laserstråling.

VAROITUS! LAITTEEN KAYTTÄMINEN MUULLA KUIN TASSA KAYTTOOHJEESSA MAINTULLA TAVALLA SAATTAA ALTISTAA KAYTTAJÄN TURVALLISUUSLUOKAN 1 YLITTÄVÄLLE NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLÉ.

## CHASSIS-EXPLODED VIEW



# CHASSIS EXPLODED VIEW PART LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	27100249B	Chassis	94	29361218	Label,laser <P/W/Q>
2	27130661B	Bracket C	95	29360811A	Label <P>
4	27141496A	Retainer S	96	29361298A	Label SEM <P>
8	27121743	Rear panel <D>	97	29361342A	Label SEM/ETIN <P>
8	27121744	Rear panel <P>	98	29361507	Label NOR <P>
27121746	Rear panel <W>	99	29360687	Label CLASS 1 <P/W/Q>	
27121747	Rear panel <Q>	F901	252075	△ 2.5A-SE-EAK,Fuse <P>	
27300750	△ Cord,bushing	P801	253161 or	△ AS-UC-4#18,	
10	27190009	KGLS-4S,Holder	253168	△ Power supply cord <D>	
11	27190524	KGLS-14RT,Holder	253149 or	△ AS-CEE,	
12	27300834	WS-2NS,Clamp	253164	△ Power supply cord <P/W>	
13	27300833	Clamp,lead	253118 or	△ AS-SAA,	
14	27255004	Joint,power	253170	△ Power supply cord <Q>	
15	27273142	Spacer	25065195	△ NSS-1288P,Voltage selector switch <W>	
16	27270327A	Back plate	T901	2300905A	△ NPT-1174D,Power transformer <D>
18	2813269A	KGLS-6RT,Holder	2300906A	△ NPT-1174P,Power transformer <P>	
19	27190693A	4TTB+10C(BC),Self-tapping screw	2300907A	△ NPT-1174DG,Power transformer <W>	
21	8338440109	3TTS+8B(BC),Self-tapping screw	2300908A	△ NPT-1174Q,Power transformer <Q>	
22	8334430088	3TTW+8B(BC),Self-tapping screw	2300910A	△ NPT-1175D,Power transformer <D>	
23	8311130088	3TTP+8P(BC),Self-tapping screw	2300911A	△ NPT-1175P,Power transformer <P>	
24	8333430080	3STS+8BQ(BC),Self-tapping screw	2300912A	△ NPT-1175DG,Power transformer <W>	
25	801230	2.6TTP+6P(BC),Self-tapping screw	2300913A	△ NPT-1175Q,Power transformer <Q>	
26	8334246060	Isolating plate	U1	1H222544-1	NAAR-4744-1,Main circuit pc board ass'y
28	28172205	Front bracket ass'y	U2	1H222545-1	NADG-4745-1,Digital circuit pc board ass'y <D>
31	27110659E	Top cover	U3	1H222545-1A	NADG-4745-1A,Digital circuit pc board ass'y <P/W/Q>
41	28184490B	0.9×250×10,Cushion	U4	1H222546-1	NAAF-4746-1,Output terminal pc board ass'y
43	28140837	0.5×195×125,Cushion	U5	1H222547-1	NAPS-4747-1,Regulator circuit pc board ass'y
44	28141009	Front panel ass'y	U6	1H222548-1	NADIS-4748-1,Display circuit pc board ass'y
51	1H2222701K	Isolating plate	U7	1H222549-1	NAAF-4749-1,Headphone amplifier pc board ass'y
52	28175190	Side panel L <N>	U8	1H222550-1	NAAF-4750-1,Headphone terminal pc board ass'y
61	28185377	Side panel L <P/W/Q>	U9	1H222551-1	NAPS-4751-1,Rectifier circuit pc board ass'y
61	28185371	Side panel R <N>	U10	1H222552-1	NASW-4752-1,Power switch pc board ass'y <D/W/Q>
62	28185378	Side panel R <P/W/Q>	U11	1H222553-1	NASW-4753-1A,Power switch pc board ass'y <P>
63	837440169	4TTT+16C(BC),Special screw	U10	1H222553-1	NASW-4753-1,Dimmer switch pc board ass'y
64	8334440088	4TTTS+8B(BC),Self-tapping screw	U11	1H222554-1	NAETC-4754-1,Remote control sensor pc board ass'y
65	87644012	W4×12F(BC),Washer	Z1	NCD-40M,CD mechanism ass'y	
67	27175254	Leg	260208	Wire tie	
68	834430088	3TTS+8B(BC),Self-tapping screw			
71	28148271A	Door			
72	3TTP+6B(BC),Self-tapping screw				
73	838430068				
74	834430080				
74	28191604A	Clear plate			
75	28335034A	Lever,lock			
81	28324397	Knob,power			
82	28324492	Knob,level			
91	2046296012	NCFC7-296012,Flat cable			
92	2046291512	NCFC7-291512,Flat cable			
93	29360807	Label DANGER			

NOTE: THE COMPONENTS IDENTIFIED BY MARK △ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

NOTE: <D> : 120V model only  
 <P> : 230V model only  
 <Q> : 240V model only  
 <W> : Worldwide model only  
 <N> : U.S.A. model only



# MECHANISM-PART LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	27100219A	Chassis ass'y,pickup	73	27301338	Middle pulley
2	24110012	SPU-3013,Optical pickup	74	27301339	Pulley
3	25134076	NCETC-4076,Flexible pc board	75	27301389	Drive pulley
4	24506955	Shaft	76	27301341	Flat pulley
5	27270322	Spacer	77	27301350	Rubber belt S
6	27270323	Spacer	78	27301351	Rubber belt L
7	24506952	Bracket,shaft	81	1H048902	Motor ass'y
11	24502261	SLA2002,Motor,slide	82	27301468	Bush,motor
12	24506950	Block,terminal	83	1H169537-2	NAETC-3937-2,Terminal pc board ass'y
13	24506953	Bracket LM	86	2009990290	NSAS-6P0423,Socket
14	24506951	Basc LM	87	2009990099B	NSAS-18P0138,Socket
15	24506954	Holder LM	88	2002341435	NSAS-14P0430,Socket
18	29110083	Tape	89	2009990291	NSAS-5P0424,Socket
21	27301335D	Chassis L	90	27190775	Holder
29	27270212	Spacer	91	25065422	NMS-1220,Microswitch
30	27180467	Plate spring	92	29110083	Tape
31	27260297A	Shaft,guide	93	27270342	Spacer,guide
32	27141408	Bracket,shaft	S1	82112010	2P+10F,Pan head screw
33	27301342	Shaft,base	S2	838426088	2.6TTB+8B(BC),Self-tapping screw
34	27270324	Spacer	S3	838120080	2TTB+8P,Self-tapping screw
35	27270325A	Spacer	S4	833426050	2.6TTP+5P(BC),Self-tapping screw
36	27141438	Bracket,base	S5	834430068	3TTS+6B(BC),Self-tapping screw
37	27141409	Bracket,switch	S6	863120	N-2F,Nut
38	27180460	Spring	S7	831126060	2.6TTW+6P,Self-tapping screw
39	27141440A	Bracket H	S8	833326148	2.6TTP+14B,Self-tapping screw
40	27301343	Arm	S9	834430088	3TTS+8B(BC),Self-tapping screw
41	28141061A	Cushion CH	S10	82143004	3P+4FN(BC),Pan head screw
42	27301352	Cap CH	S11	838120080	2TTB+8P,Self-tapping screw
43	27301344	Yoke CH	S12	8930251S	ES-2.5S,Ring E
44	28181019A	Magnet CH	S13	801470	Special screw
46	27260308	Shaft RO	S14	838426088	2.6TTB+8B(BC),Self-tapping screw
47	27301465A	Roller			
48	27190861A	Holder RO			
51	27301345A	Chassis,sub			
52	27301466A	Cushion rubber			
54	27301347A	Spacer,floating			
55	27180461	Spring,silver			
56	27180462	Spring,green	P001	25050428	NSCT-18P,Socket
57	27180463	Spring,yellow	P103A	25055139	NPLG-9P123,Plug
58	27270330	Spacer	P108A	25055151	NPLG-7P135,Plug
61	27301349B	Cam plate			
62	27301331-1	Disc tray			
63	27301333B	Guide,bearing			
64	28141081	Cushion,tray			
66	27301391	Rope			
67	27180464	Spring,wire	A	260447	G902S
71	27301337	Flat wheel	B	260451	#331
72	27301336	Pulley,gear	C		G947P

## TERMINAL PC BOARD-PARTS LIST

CIRCUIT NO.	PART NO.	DESCRIPTION
P001	25050428	NSCT-18P,Socket
P103A	25055139	NPLG-9P123,Plug
P108A	25055151	NPLG-7P135,Plug

## LUBILICATION

POINT	PART NO.	DESCRIPTION
A	260447	G902S
B	260451	#331
C		G947P

## CAUTION ON REPLACEMENT OF PICKUP

The laser diode in the optical pickup block is so sensitive to static electricity, surge current and etc. that the components are liable to be broken down or its reliability remarkably deteriorated.

During repair, carefully take the following precautions.  
(The following precautions are included in the service parts).

### PRECAUTIONS

#### 1. Ground for the work-desk.

Place a conductive sheet such as a sheet of copper (with impedance lower than  $10^6 \Omega$ ) on the work-desk and place the set on the conductive sheet so that the chassis.

#### 2. Grounding for the test equipment and tools.

Test equipments and toolings should be grounded in order that their ground level is the same the ground of the power source.

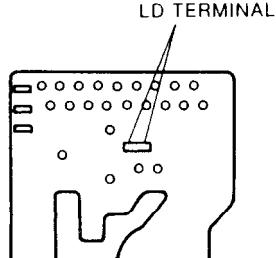
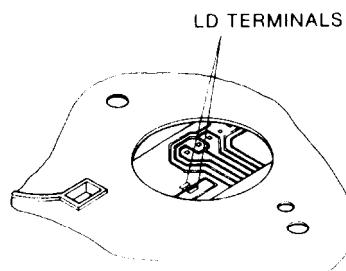
#### 3. Grounding for the human body.

Be sure to put on a wrist-strap for grounding whose other end is grounded.

Be particularly careful when the workers wear synthetic fiber clothes, or air is dry.

#### 4. Select a soldering iron that permits no leakage and have the tip of the iron well-grounded.

#### 5. Do not check the laser diode terminals with the probe of a circuit tester or oscilloscope.



Flake pc board on the pick up

#### (Care should be taken with the optical pickup.)

The optical pickup is sensitive to static electricity, surge currents, and other high electrical noise, and because there is the possibility of damage to performance, in the handling of the pickup, the utmost care must be taken, particularly with regard to static electricity.

#### Mechanism ass'y removement

When remove the mechanism ass'y, first short the LD terminals on the pc board and remove the mechanism ass'y.

#### Optical pickup removement

- When replacing the optical pickup, first short the LD terminals and remove the connector. Also, when attaching the new optical pickup, after attaching the connector, unsolder the LD terminals.

- Do not touch the optical pickup object lens with the hands.

## PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

#### **WARNING!!**

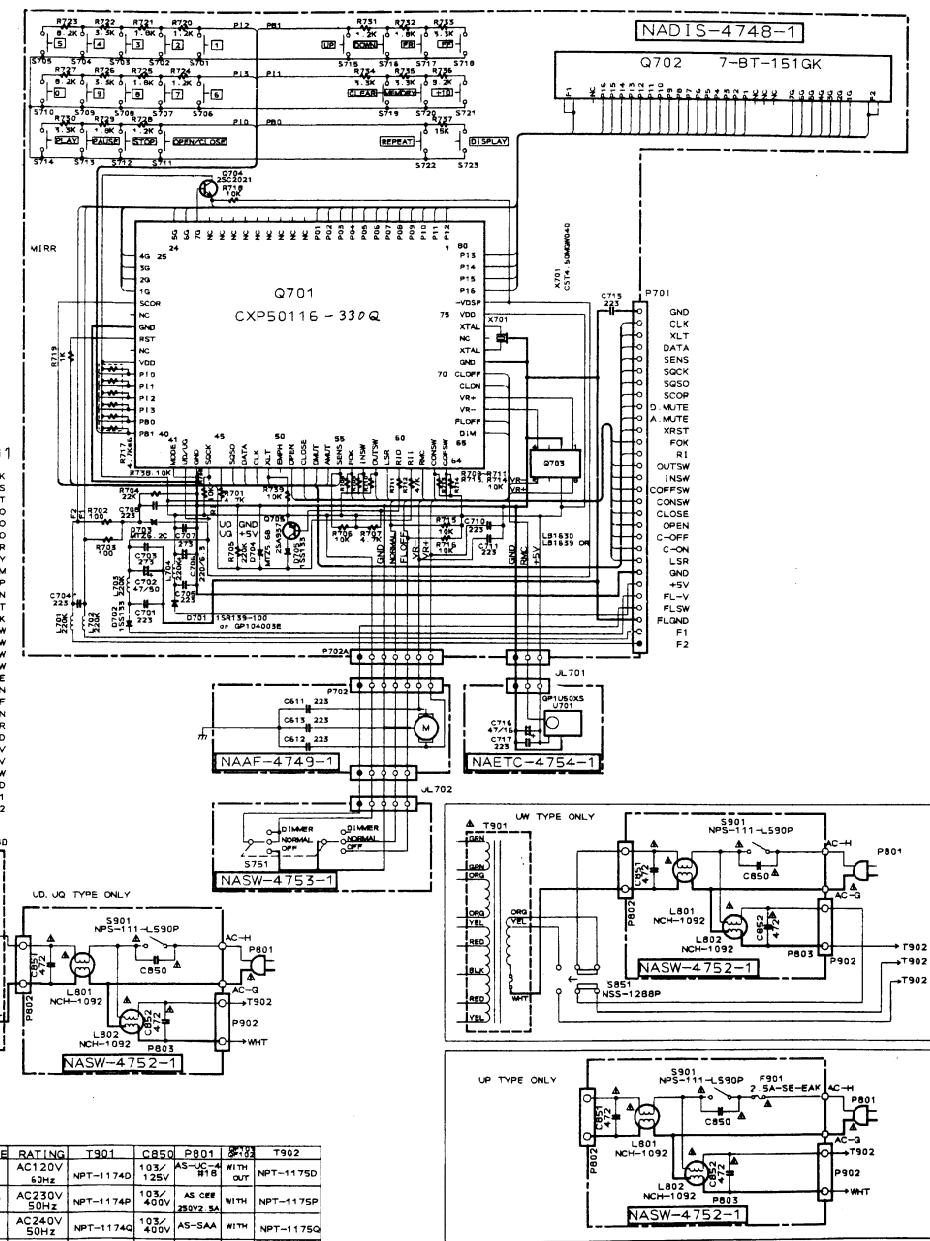
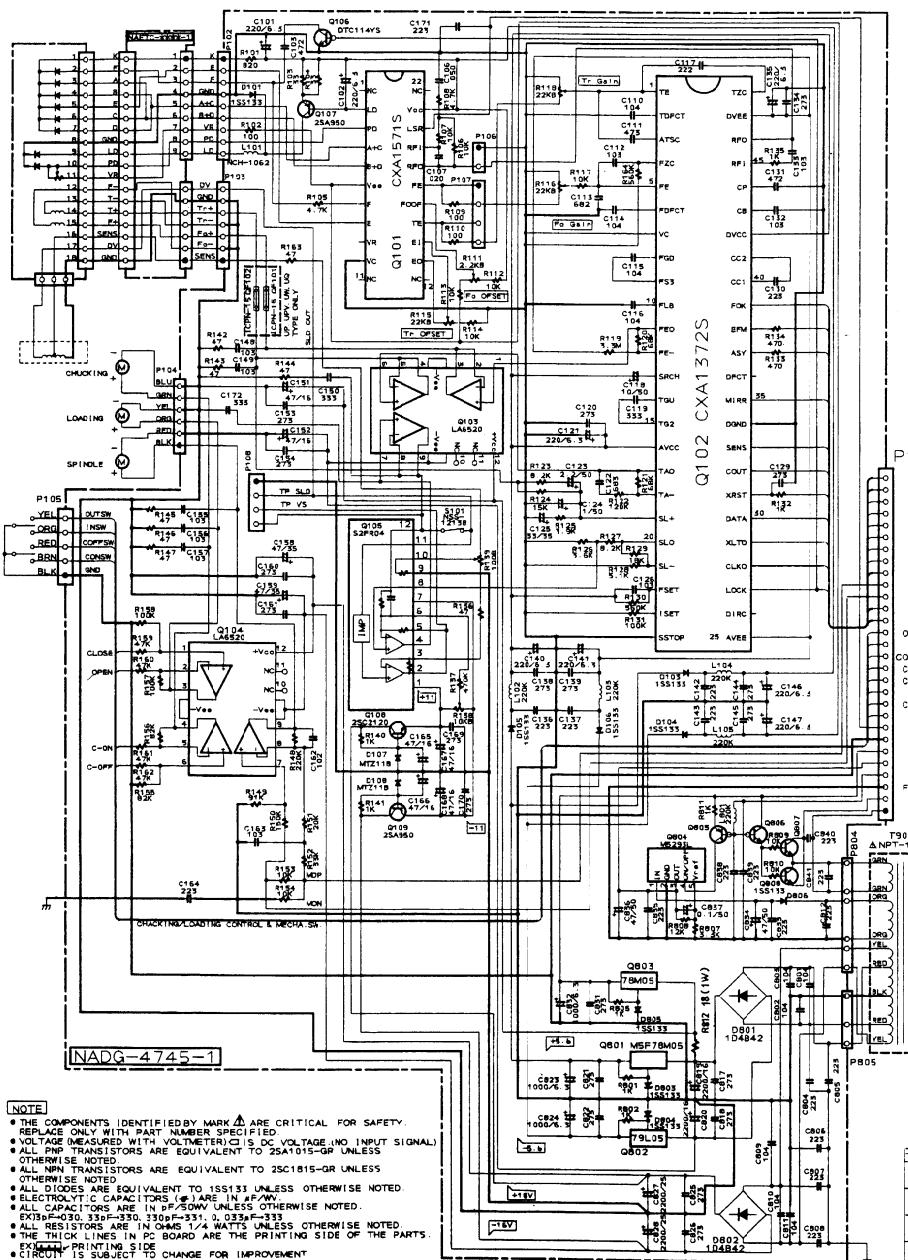
**WHEN SERVICING, DO NOT APPROACH THE LASER EXIT WITH THE EYE TOO CLOSELY. IN CASE IT IS NECESSARY TO CONFIRM LASER BEAM EMISSION, BE SURE TO OBSERVE FROM A DISTANCE OF MORE THAN 30cm FROM THE SURFACE OF THE OBJECTIVE LENS ON THE OPTICAL PICK-UP BLOCK.**

#### **Laser Diode Properties**

- Material: GaAs/GaAlAs
- Wavelength: 780nm
- Emission Duration: continuous
- Laser output: max. 0.5mW\*

\*This output is the value measured at a distance about 1.8mm from the objective lens surface on the Optical Pick-up Block.

**SCHEMATIC DIAGRAM** PART 1



**NOTE:** THE COMPONENTS IDENTIFIED BY MARK A ARE CRITICAL FOR SAFETY.  
REPLACE ONLY WITH PART NUMBER SPECIFIED.  
• VOLTAGE (MEASURED WITH VOLTMETER) IS DC VOLTAGE (NO INPUT SIGNAL).  
• ALL TRANSISTORS ARE EQUIVALENT TO 2SA1049 OR UNLESS  
OTHERWISE NOTED.  
• ALL NPN TRANSISTORS ARE EQUIVALENT TO 2SC1815 OR UNLESS  
OTHERWISE NOTED.  
• ALL DIODES ARE EQUIVALENT TO 1N5313 UNLESS OTHERWISE NOTED.  
• ELECTROLYTIC CAPACITORS (C) ARE IN  $\mu$ F UNLESS OTHERWISE NOTED.  
• RESISTORS ARE IN OHMS UNLESS OTHERWISE NOTED.  
 $EX10 = 0.033\ \Omega$ ,  $EX11 = 130$ ,  $130\ \Omega$ ,  $EX12 = 0.133\ \Omega$ .  
• ALL RESISTORS ARE IN OHMS 1/4 WATT UNLESS OTHERWISE NOTED.  
• THE THICK LINES IN PC BOARDS ARE THE PRINTING SIDE OF THE PARTS.  
• EX10, EX11, EX12, EX13, EX14, EX15, EX16, EX17, EX18, EX19,  
CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

A

B

C

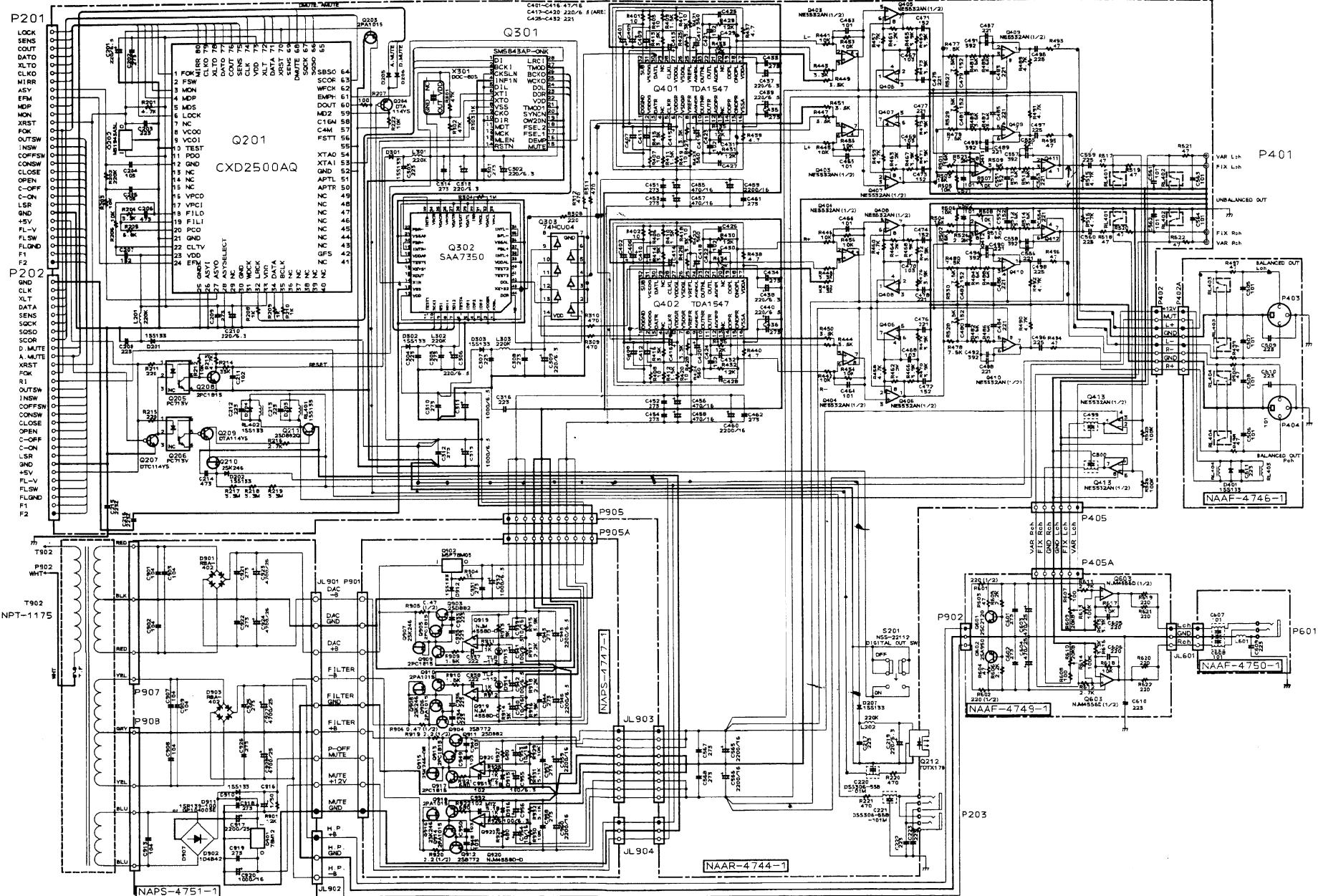
D

E

F

G

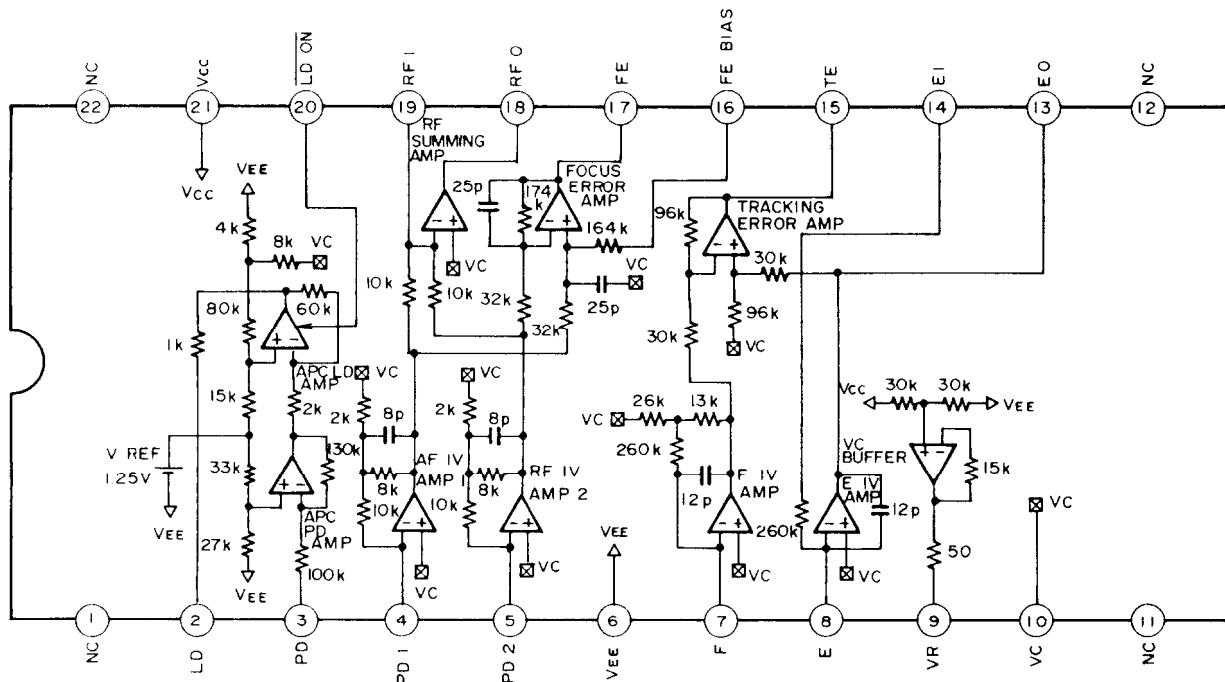
# SCHEMATIC DIAGRAM PART 2



# IC BLOCK DIAGRAM AND DESCRIPTIONS

**Q101**

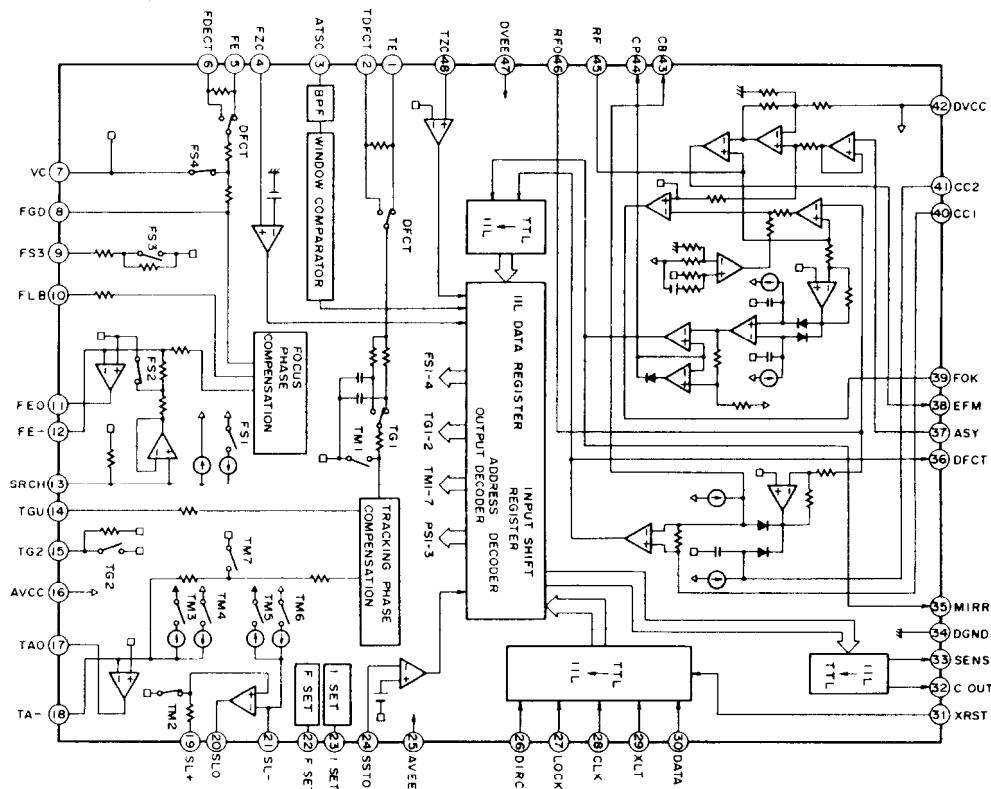
**CXA1571S (RF Amplifier)**



Pin No.	Symbol	I/O	Description
2	LD	O	Output terminal of APC amplifier.
3	PD	I	Input terminal of APC amplifier.
4	PD1	I	Inversion input terminal for RF I-V amplifier. Connect to photo diode A+C.
5	PD2	I	Inversion input terminal for RF I-V amplifier. Connect to photo diode B+D.
7	F-IN	I	Inversion input terminal for F I-V amplifier. Connect to photo diode F.
8	E-IN	I	Inversion input terminal for E I-V amplifier. Connect to photo diode E.
9	VR	O	DC voltage output of (V <sub>CC</sub> +V <sub>EE</sub> )/2.
10	VC	I	Middle point voltage input terminal.
13	EO	O	Monitor output terminal for I-V amplifier E.
14	EI	-	Gain adjustment terminal for I-V amplifier E.
15	TE	O	Tracking error amplifier output terminal. The signal E-F is output from this terminal.
16	FE-BIAS	I	Bias adjustment terminal for non-inversion side of focus error amplifier.
17	FE	O	Focus error amplifier output terminal.
18	RFO	O	RF amplifier output terminal.
19	RF1	I	Inversion input terminal of RF amplifier.
20	LD-ON	I	Change-over terminal for APC amplifier.

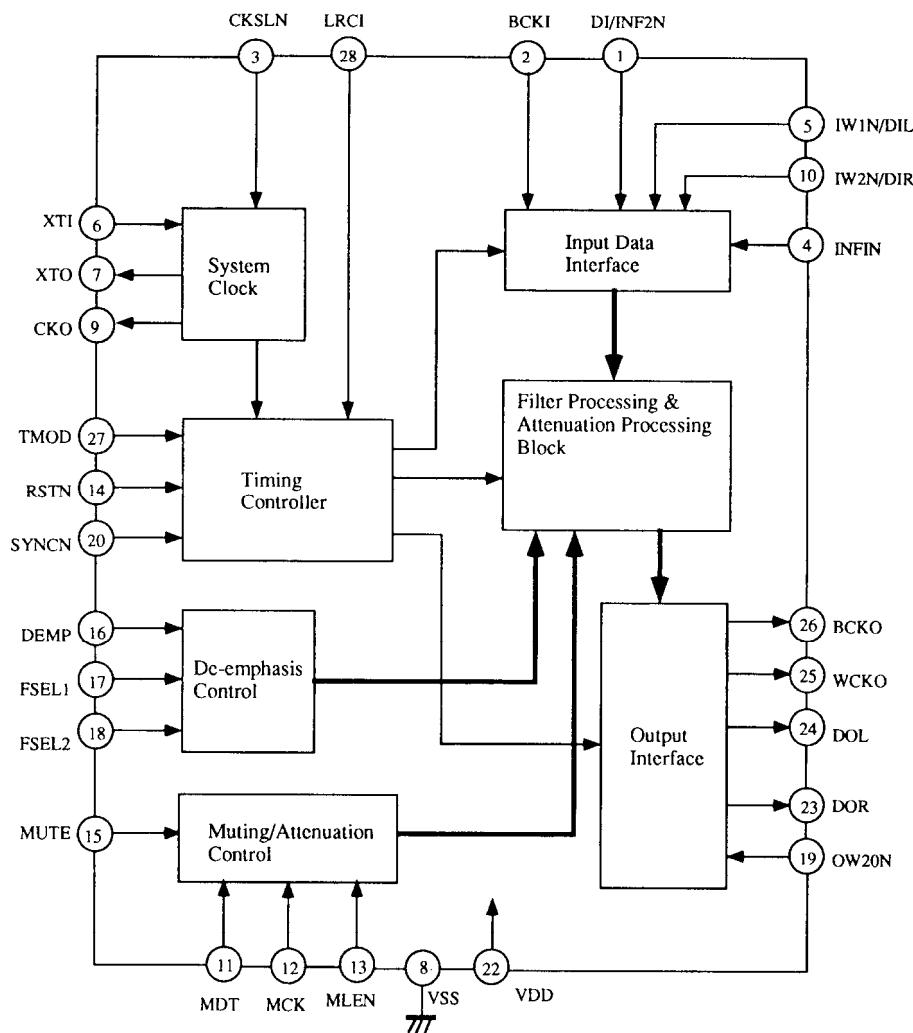
Q102

## CXA1372S (RF Signal Processor Servo Amplifier)



PIN NO.	SYMBOL	I/O	DESCRIPTION	PIN NO.	SYMBOL	I/O	DESCRIPTION
1	TE	I	Tracking error input terminal.	22	FSET	I	Peak setting input of phase correction of focus tracking.
2	TDFCT	I	Capacitor connection terminal for time constant when defect.	23	ISET	I	This terminal is flowed the current so that the focus search, tracking jump, and sled kick height is decided.
3	ATSC	I	Window comparator input terminal for ATSC detection.	24	SSTOP	I	Inner switch selection input terminal.
4	FZC	I	Focus zero-cross comparator input terminal.	26	DIRC	I	This terminal is used when a track jump.
5	FE	I	Focus error input terminal.	27	LOCK	I	The sled runaway prevention circuit operates at the low level.
6	FDFCT	I	Capacitor connection terminal for time constant when detect.	28	CLK	I	Serial data transfer clock input from microprocessor.
7	VC	I	Mid-point voltage input terminal.	29	XLT	I	Latch input from microprocessor.
8	FGD	I	Connect the capacitor between pin 9 and this pin when the high frequency gain of focus servo is dropped.	30	DATA	I	Serial data input from microprocessor.
9	FS3	I	Focus servo high frequency gain changeover input terminal.	31	XRST	I	Reset input terminal. Active low.
10	FLB	I	Input terminal for the low frequency boost of focus servo.	32	C. OUT	O	Signal output to count the track numbers.
11	FEO	O	Focus drive output terminal.	33	SENS	O	This terminal outputs FZC, and SSTOP to according command from microprocessor.
12	FE-	I	Inversion input terminal of focus amplifier.	35	MIRR	O	Mirror comparator output terminal.
13	SRCH	I	Time constant terminal to make the focus search waveform.	36	DFCT	O	Defect comparator output terminal.
14	TGU	I	Tracking high frequency gain changeover input terminal.	37	ASY	I	Auto asymmetry control input terminal.
15	TG2	I	Tracking high frequency changeover input terminal.	38	EFM	O	EFM comparator output terminal.
17	TAO	O	Tracking drive output terminal.	39	FOK	O	Focus OK comparator output terminal.
18	TA-	I	Inversion input terminal of tracking amplifier.	40	CCI	O	Defect bottom hold output terminal.
19	SL+	I	No-inversion input terminal of sled amplifier.	41	CC2	I	Defect bottom hold input terminal from CCI.
20	SLO	O	Sled(slide) drive output terminal.	43	CB	I	Defect bottom hold capacitor connection terminal.
21	SL-	I	Inversion input terminal of sled amplifier.	44	CP	I	Mirror hold capacitor connection terminal.
				45	RF1	I	RF summing amplifier input terminal.
				46	RFO	O	RF summing amplifier output terminal.
				48	TZC	I	Tracking zero-cross comparator input terminal.

**Q301**  
**SM5843AP-ONK (8 Times Oversampling Digital Filter)**



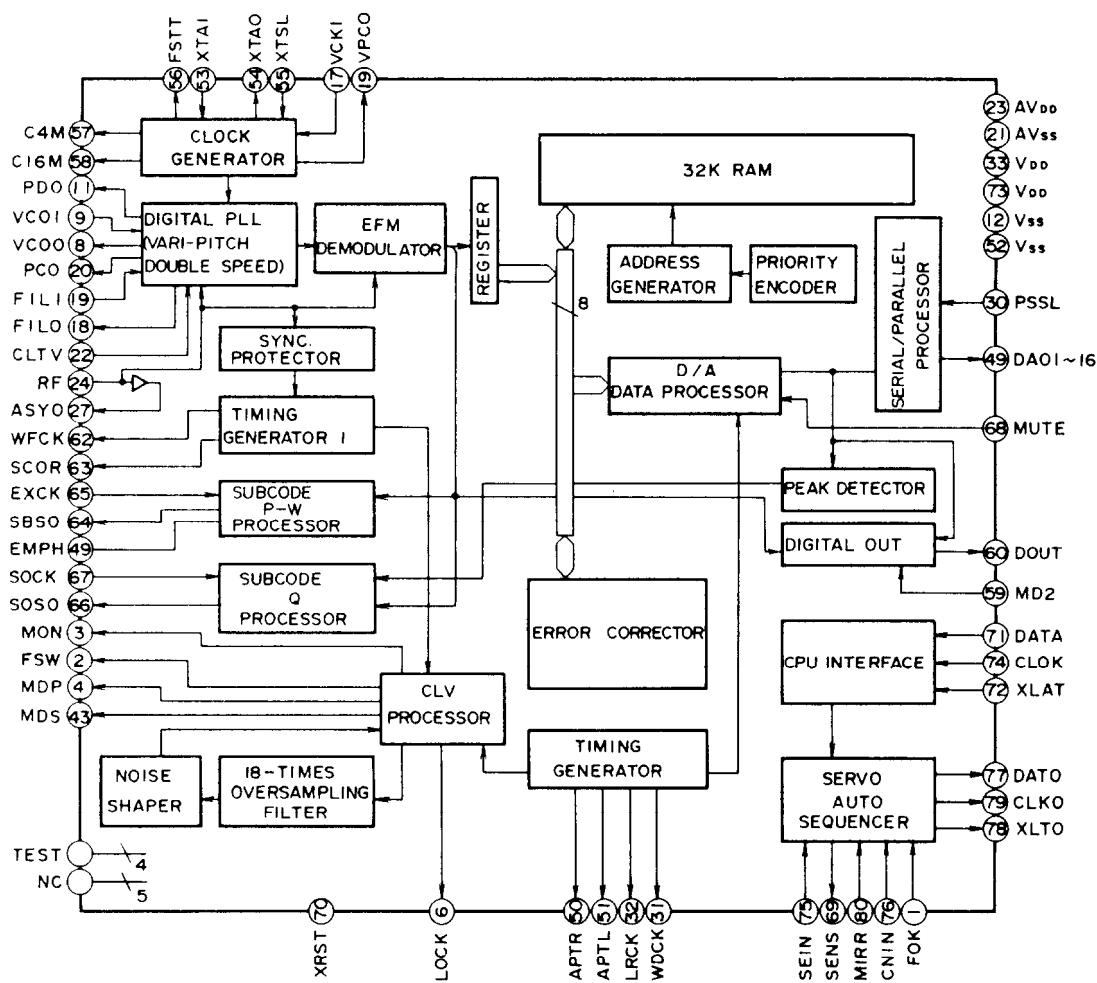
Data input	DI/INF2N	1	28	LCI	Sample rate clock of input data
Bit clock input	BCKI	2	27	TMOD	Filter selector
Selector for resonator or input frequency	CKSLN	3	26	BCKO	Bit clock output
	INF1N	4	25	WCKO	Word clock output
	IW1N/DIL	5	24	DOL	L ch. data output
Clock input	XTI	6	23	DOR	R ch. data output
	XTO	7	22	VDD	
	VSS	8	21	NC	
Clock output	CKO	9	20	SYSCN	
	IW2N/DIR	10	19	OW2ON	
	MDT	11	18	FSEL2	
	MCK	12	17	FSEL1	
	MLEN	13	16	DEMP	DE-emphasis control ON:H
System reset Reset : L	RSTN	14	15	MUTE	Muting output Mute: H

Q302

## SAA7350 (Noise Sharper)

Pin No.	Mark	Function
1	XSEL	Crystal frequency select. This pin is used to select the master crystal frequency as follows:- XSEL HIGH=384fs XSEL LOW=256fs This pin defaults to XSEL HIGH when not connected.
2	DOEN	One-bit Digital Output Enable. When LOW, the one-bit code outputs are made available for DAC7. (not used.)
3	IDF3	Input data format. These three pins determine the input format
4	IDF2	the device is to operate in. If unconnected these pins will default
5	IDF1	HIGH(i.e. burst clock mode).
6	TEST4	This pin should be left open circuit.
7	SDI2	Serial Data Input. Used in simultaneous mode only (for the right channel signal). When not used, this pin will be internally pulled high.
8	SDI1	Serial Data Input. This should be a 16,18 or 20-bit linear 2's complement PCM signal. In simultaneous mode this pin is used for the left channel signal.
9	WSI	Serial input Word Select Signal. Signifies whether data word is for the left or right channel. Can be either fs, 2fs, 4fs or 8fs where fs is the system sampling frequency. fs can lie between 16kHz and 53kHz.
10	SCKI	Bit clock input for the serial input interface.
11	TEST1	This pin should be left open circuit.
12	VDD	5V power supply for digital section.
13	VSS	Ground connection for the digital section.
14	XIN	Crystal Oscillator Input.
15	XOUT	Crystal Oscillator Output.
16	XSYS1	Buffered Oscillator Output.
17	TEST5	In normal operation this pin should be tied LOW.
18	VDDAR	Analogue 5V supply for right channel.
19	INTR+	Output from the right positive switched-capacitor integrator. Input to differential op-amp.
20	FBR+	Feedback connection for the right positive switched-capacitor integrator.
21	VSSAR	0V supply for right channel.
22	FBR-	Feedback connection for the right negative switched-capacitor integrator.
23	INTR-	Output from the right negative switched-capacitor integrator. Input to differential op-amp.
24	VRCR	High impedance voltage reference for the right channel inputs. Typically VDDAR/2.
25	VDACR	Reference voltage supply for right channel DAC's. Normally this will be connected to VSS.
26	VROR	Right channel voltage reference output. Typically VDDAR/2.
27	VDDATR	5V supply for right channel analogue timing.
28	VSSAT	0V supply for left and right channel analogue.
29	VDDATL	5V supply for left channel analogue timing.
30	IRR	24 kohm bias resistor connection for the reference current generator circuit.
31	VROL	Left channel voltage reference output. Typically VDDAL/2.
32	VDACL	Reference voltage supply for left channel DAC. Normally this will be connected to VSS.
33	VRCL	High impedance voltage reference for left channel inputs and for bias current generator. Typically VDDAL/2.
34	INTL-	Output from left negative switched capacitor integrated. Input to differential op-amp.
35	FBL-	Feedback connection for the left negative switched-capacitor integrator.
36	VSSAL	0V supply for left channel.
37	FBL+	Feedback connection for the left positive switched-capacitor integrator.
38	INTL+	Output from the left positive switched-capacitor integrator. Input to differential op-amp.
39	VDDAL	Analogue 5V supply for left channel.
40	TEST2	This pin should be left open circuit.
41	TEST3	This pin should be left open circuit.
42	DOL	Digital output left. Left channel one-bit code for DAC7, when disabled this pin will be driven LOW. (Not used.)
43	XSYS2	Output clock at a frequency of half the master clock frequency.
44	DOR	Digital output right. Right channel one-bit code for DAC7, when disabled this pin will be driven LOW. (not used.)

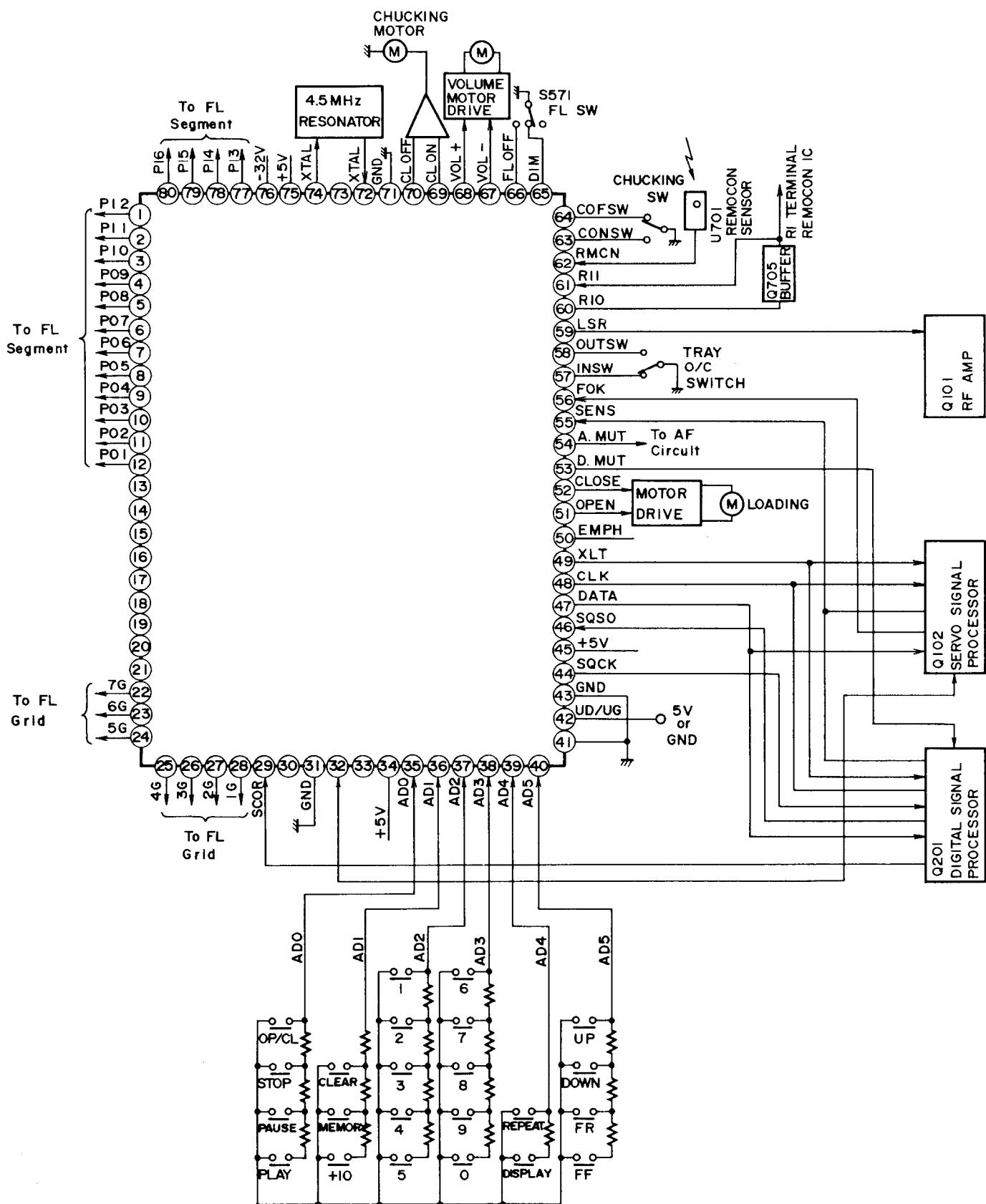
**Q201**  
**CXD2500AQ/BQ (Digital Signal Processor)**



NO.	SYMBOL	I/O	DESCRIPTION	NO.	SYMBOL	I/O	DESCRIPTION
1	FOK	I	Focus OK input	42	DA08	O	GFS output
2	FSW	O	Output filter changeover output of spindle motor	43	DA07	O	RFCK output
3	MON	O	Spindle motor control output	44	DA06	O	C2P0 output
4	MDP	O	Spindle motor servo control	45	DA05	O	XRAOF output
5	MDS	O	Spindle motor servo control	46	DA04	O	MNT3 output
6	LOCK	O	H when GFS is high	47	DA03	O	MNT2 output
7	NC			48	DA02	O	MNT1 output
8	VCOO	O	Oscillation circuit output for analog FEM PLL	49	DA01	O	MNT0 output
9	VCOI	I	Oscillation circuit input for analog EFM PLL (8.6436MHz)	50	APTR	O	Control output for aperture correction. H when Rch.
10	TEST	I	Test terminal	51	APTL	O	Control output for aperture correction. H when Lch.
11	PDO	O	Charge pump output for analog EFM PLL	52	Vss		Ground
12	Vss		Ground terminal	53	XTAI	I	Crystal oscillation circuit input of 16.9344MHz or 33.8688MHz input
13-15	NC			54	XTAO	O	Crystal oscillation circuit output of 16.9344MHz
16	VPCO	O	PLL charge pump output for variable pitch	55	XTSL	I	Crystal selection input terminal. L when 16.9344MHz. H when 33.8688MHz.
17	VCKI	I	Clock input for variable pitch from VCO (16.934MHz)	56	FSTT	O	2/3 divided output of pins 53 & 54
18	FILO	O	Filter output for master PLL	57	C4M	O	4.2336MHz output
19	FILI	I	Filter input for master PLL	58	C16M	O	16.9344MHz output
20	PCO	O	Charge pump output for master PLL	59	MD2	I	Digital output control input. On at H & Off at L.
21	AVss		Analog ground	60	DOUT	O	Digital output
22	CLTV	I	VCO control voltage input for master	61	EMPH	O	Emphasis control output. Active H.
23	AVDD		Analog section power supply (+5V)	62	WFCK	O	Write frame clock output
24	RF	I	EFM signal input	63	SCOR	O	Sub-code detection output. H when is detected S0 or S1.
25	TEST2	I	Connect to the ground.	64	SBSO	O	Serial output of sub code(P~W)
26	TEST3	I	Connect to the ground.	65	EXCK	I	Clock input for read out SBSO
27	ASYO	O	EFM full swing output	66	SQSO	O	Sub Q 80 bits, PCM peak, and level data 16 bits output
28	TEST4	I	Connect to the ground.	67	SQCK	I	Clock input for read out SQSO
29	NC			68	MUTE	O	Muting control output. Active H.
30	PSSL	I	Audio data output mode changeover input. Serial data at L and parallel data at H.	69	SENS	-	Sens output. Output to microprocessor
31	WDCK	O	D/A interface for 48 bits slot. Word clock f=2Fs.	70	XRST	I	System reset. Rest at low level.
32	LRCK	O	D/A interface for 48 bits slot. LR clock f=F <sub>s</sub> .	70	DATA	I	Serial data input from microprocessor
33	VDD		Power supply terminal (+5V)	72	XLTA	I	Latch input from microprocessor. Latch the serial data at trailing.
34-49			Data output terminals	73	VDD		Power supply
		PSSL=1	PSSL=0	74	CLOK	I	Serial data transfer clock input from microprocessor
34	DA16	O	DA16 Serial data of 48 bits slot	75	SEIN	I	Sens input from SSP
35	DA15	O	DA15 Bit clock of 48 bits slot	76	CNCI	I	Track jump numbers count signal input
36	DA14	O	DA14 Serial data of 64 bits slot	77	DATO	O	Serial data output to SSP
37	DA13	O	DA13 Bit clock of 68 bits slot	78	XLTO	O	Serial data latch output to SSP. Latch at trailing.
38	DA12	O	DA12 LR clock of 68 bits slot	79	CLKO	O	Serial data transfer clock output to SSP
39	DA11	O	DA11 GTOP output	80	MIRR	I	Mirror signal input
40	DA10	O	DA10 XUGF output				
41	DA09	O	DA09 XPLCK output				

Note:SSP:Q102 CXA1372S

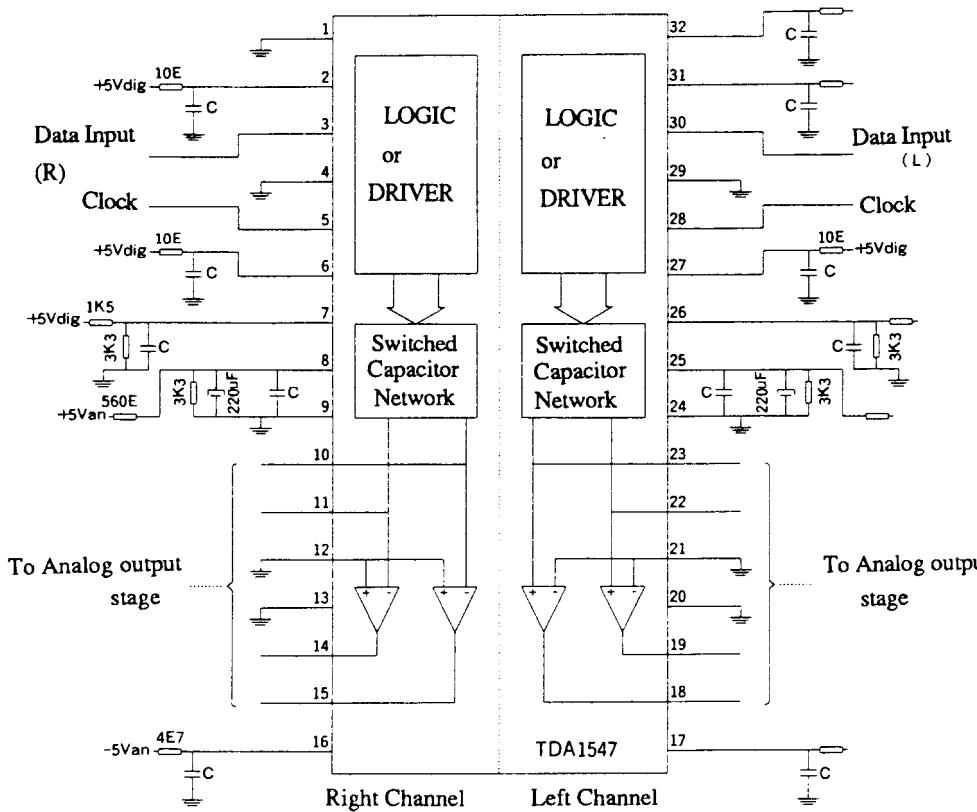
**Q701**  
**CXP50116-330Q (Microprocessor)**



Pin No.	Symbol	I/O	Descriptions
1~12	P01~P12	O	Fluorescent indicator tube segment output terminals. Active high.
22~28	7G~1G	O	Fluorescent indicator tube grid output terminals. Active high.
29	SCOR	I	Sub code sink input terminal. Leading pulse (75Hz) is input during play.
32	XRST	I/O	Reset input terminal. Reset at low level when the power switch turns on.
34	VDD		+5V power supply.
35~40	AD0~AD5	I	A/D converter input terminals for key input.
42	UD/UG	I	Indicator method changeover input when the power switch turns on.
44	SQCK	O	Read clock output control terminal of sub code Q.
46	SQSO	I	Input terminal of sub code Q.
47	DATA	O	Data output terminal of serial command of servo system.
48	CLK	O	Clock output control terminal of serial command of servo system.
49	XLT	O	Latch command output terminal of serial command of servo system.
50	DEEMP	O	Emphasis switch control output terminal. Active high.
51	OPEN	O	Tray open operation output terminal. Open at low level.
52	CLOSE	O	Tray close operation output terminal. Close at low level.
53	D. MUT	O	Digital muting control output terminal.
54	A. MUT	O	Audio muting control output terminal. Muting turns off at low level.
55	SENSE	I	This terminal is input the conditions of servo system according serial command of servo system.
56	FOK	I	Focus OK input terminal. This terminal is the high level when focus servo operates.
57	IN SW	I	Close switch input terminal. L when the close switch turns on.
58	OUT SW	I	Open switch inut terminal. L when the open switch turns on.
59	LSR	O	Laser diode ON/OFF control output terminal. ON at low level.
60	NRSC OUT	O	System code output terminal.
61	NRSC IN	I	System code input terminal.
62	RMCN	I	Input terminal from remote control sensor.
63,64	CON/ COF SW	I	Chuckng switch detection input terminal
65	DIMMER SW NORMAL	I	The FL tube lights on normally when this terminal is the low level.
66	DIMMER SW OFF	I	The FL tube lights off when this terminal is the low level.
67	VOL DOWN	O	Volume control output terminal. Active "H".
68	VOL UP	O	Volume control output terminal. Active "H".
69, 70	CL ON/OFF	O	Chuckng motor contrul output terminal
71	V <sub>ss</sub>		Connect to GND.
72, 74	OSC	I	X'tal connection terminal
76	-32V		Power supply terminal for fluorescent indicator tube.
77~80	P13~P16	O	Fluorescent indicator tube segment output terminals. Active high.

## Q401, Q402

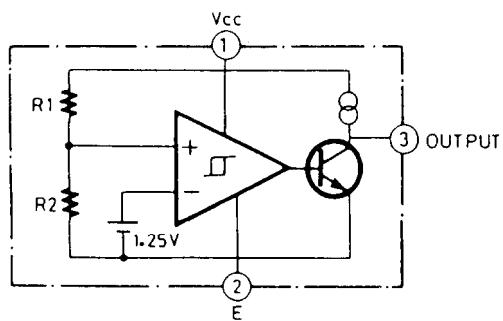
### TDA1547 (D/A converter)



Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	DGND	Digital ground	17	VDDA	Power supply +5V
2	VDDD	Digital power supply +5V	18	DNDPL	Negative output for left channel
3	DATA R	Serial 1 bit data input	19	DOPL	Positive output for left channel
4	NC		20	NC	
5	CLKR	Clock input for right channel	21	AGNDL	Analog ground
6	VDDDR	Power supply +5V	22	OUTL	Positive DAC output for left channel
7	VSSDR	Power supply -3.5V	23	OUTNL	Negative DAC output for left channel
8	VREFR	Reference power supply -4V	24	AGNDL	Analog ground
9	AGND R	Analog ground	25	VREFR	Reference power supply -4V
10	OUTNR	Negative DAC output for right channel	26	VSDGL	Power supply -3.5V
11	OUT R	Positive DAC output for right channel	27	VDDGL	Power supply +5V
12	AGND R	Analog ground	28	CLKL	Clock input for left channel
13	NC		29	NC	
14	DOPR	Positive output for right channel	30	DATAL	Serial 1 bit data input for left channel
15	DNOPR	Negative output for right channel	31	VSSDG	Power supply -5V
16	VSSA	Power supply -5V	32	SUB	Power supply -5V

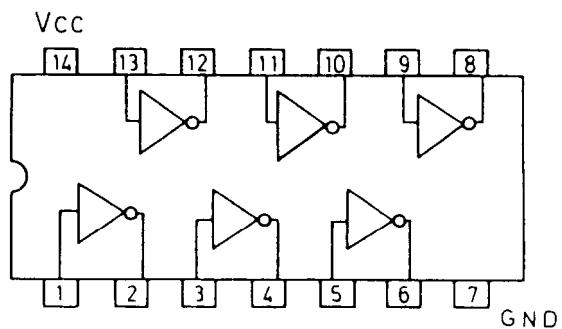
Q202

M51943ASL (System reset)



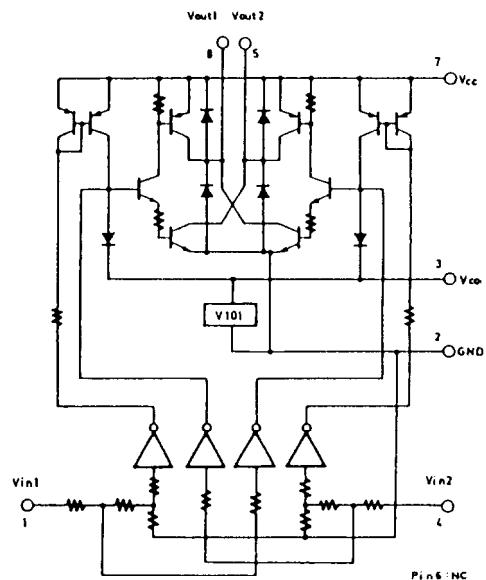
Q303

74HCU04P (Hex inverters)

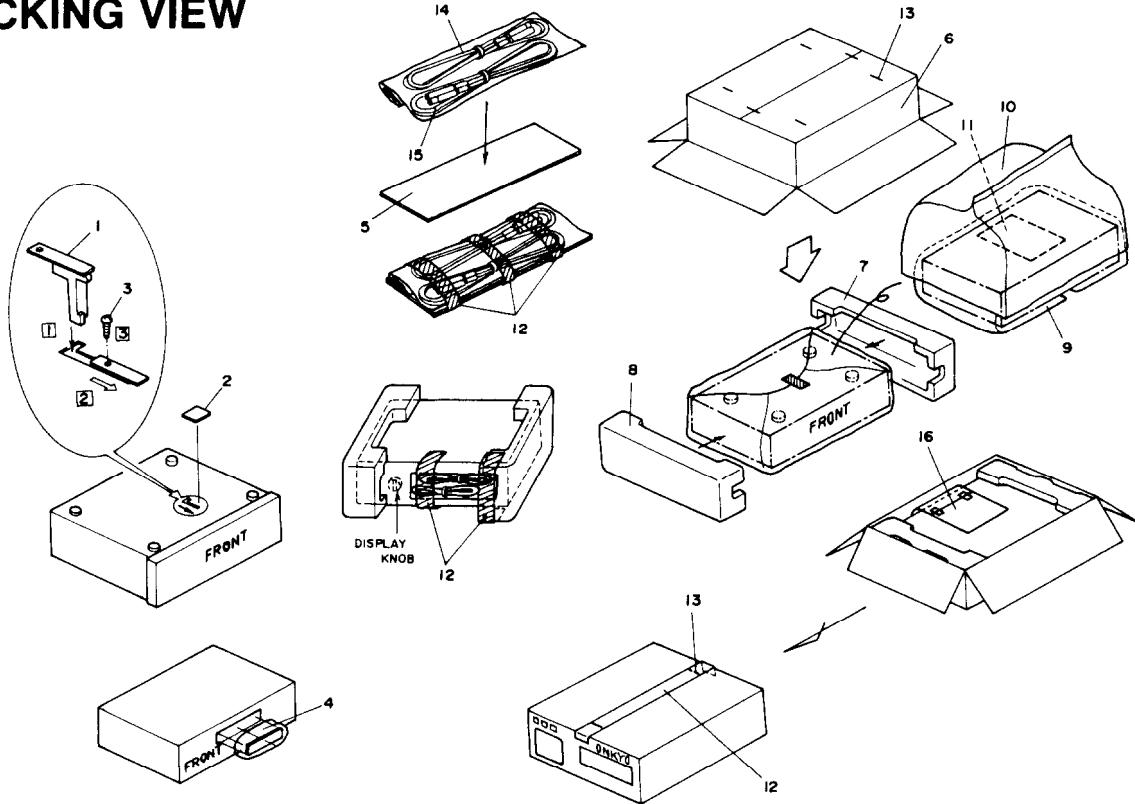


Q703

LB1639 (Volume Motor Driver)



# PACKING VIEW



REF.NO.	PART NO.	DESCRIPTION	
1	28335034A	Lock lever	
2	29361360	Label	
3	834430088	3TTS+8B(BC), Self-tapping screw	
4	29095710	Sheet, door	
5	29095705	Sheet	
6	29052619	Master carton box <B>	
	29052633	Master carton box <S>	
7	29091518B	Pad L	
8	29091519B	Pad R	
9	29095012-1	550×800mm, Protection sheet	
10	29100105	620×550mm, Styrene bag	
11	29355180	Caution sheet	
12	29110071	PP tape	
13	282301	Staple	
14	2010270	NBC-150B,Balance cord L	
15	2010271	NBC-150R,Balance cord R	
16	Accessary bag ass'y		
	2010238	Connection cord	
	2010200	Remote control cord	NOTE: <B>:Black model only
	24140218A	RC-218C,Remote control transmitter	<S>:Silver model only
	3010054	UM-3,Two batteries	<D>:120V model only
	29355193	Instruction sheet	<P>:230V model only
	29341828	Instruction manual <D>	<W>:Worldwide model only
	29341830	Instruction manual <C/P/W/Q>	<Q>:240V model only
	25055040	CV-K-2,Conversion plug <W>	<N>:U.S.A. model only
	29100097	350×250mm,Styrene bag	<F>:French model only
	29365019A	Warranty card <N>	<C>:Canadian model only
	29365024A	Warranty card <F>	
	29358002J	Service station list <N>	
	29100107	Styrene bag for warranty card <F>	

# ADJUSTMENT PROCEDURES

## Instruments required

Dual trace oscilloscope, Frequency counter, AF oscillator, Test disc (SONY YEDS-18), AC voltmeter, and Socket P4(Part no. 25050138)

### 1. Slide Balance Adjustment

1. Connect the audio oscillator to P112 SLD and the oscilloscope to P112 SLD and VS as shown below.

2. Set the output of oscillator to the square wave, 5Hz, 2Vp-p.

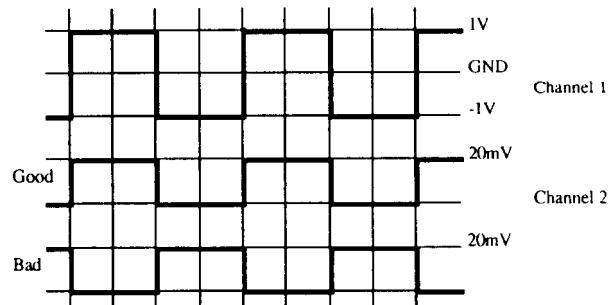
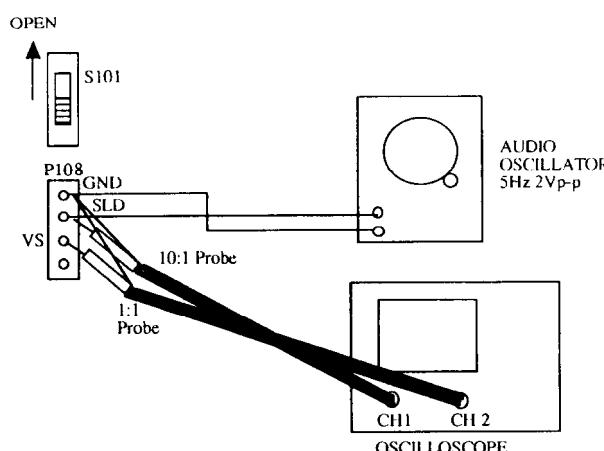
3. Turn the switch S101 to OPEN.

4. Turn the power switch to ON.

5. Confirm that the optical pickup does not move.(If it moves, control it by hand.)

6. Adjust the semi-fixed resistor R139 so that the waveforms of channels 1 and 2 become the same phase.

After adjustment, remove the audio oscillator and oscilloscope.



### 2. Slide Offset Adjustment

1. Connect the oscilloscope to P112 SLD.

2. Turn S101 to SHORT.

3. Adjust the semi-fixed resistor R138 so that the waveform on the oscilloscope becomes 0V.

### 3. Focus Offset Adjustment

Load the test disc YEDS-18 on the tray and play the track 2.

Connect the oscilloscope to the terminal P106.

Adjust R111 so that the waveform on the oscilloscope becomes maximum.

When the output is broad, set R111 to the mechanical center.

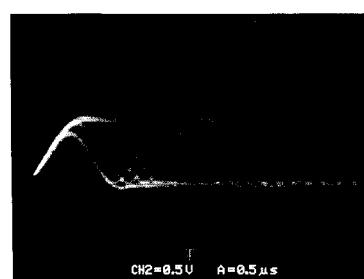
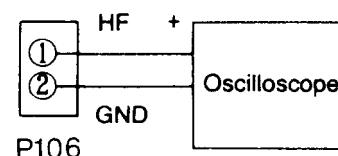


Photo 1



#### 4. Tracking offset adjustment

Load the test disc YEDS-18 on the tray and play the track 2.

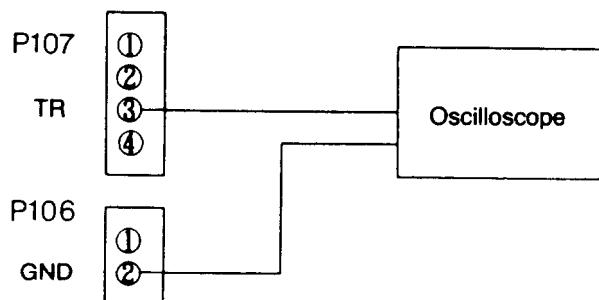
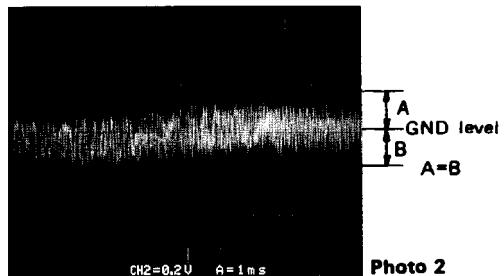
Turn R118 to minimum position. (Counter clockwise)

Connect the oscilloscope across pin 3 (TR) of P107 and P106.(Ground)

Adjust R115 until the center of tracking error signal on the oscilloscope becomes GND level.

Turn R118 to the mechanical center.

After adjustment, disconnect the oscilloscope.



#### 5. Focus gain adjustment

Set the output of AF oscillator to 800Hz, 1~1.5Vp-p.

Play the track 2 of test disc.

Connect the oscilloscope and the AF oscillator as shown below.

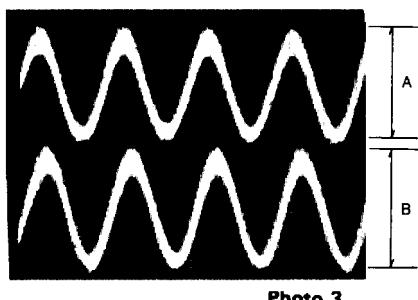
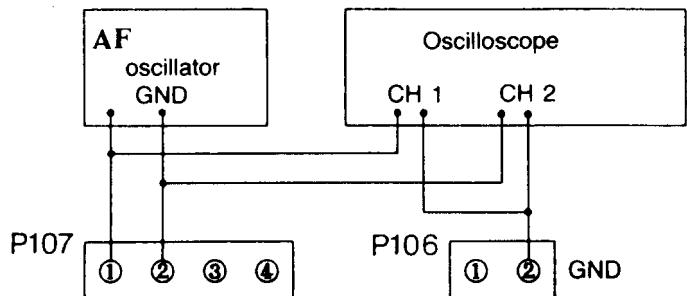


Photo 3



Adjust R116 until 800Hz components of channels 1 and 2 on oscilloscope become same level.

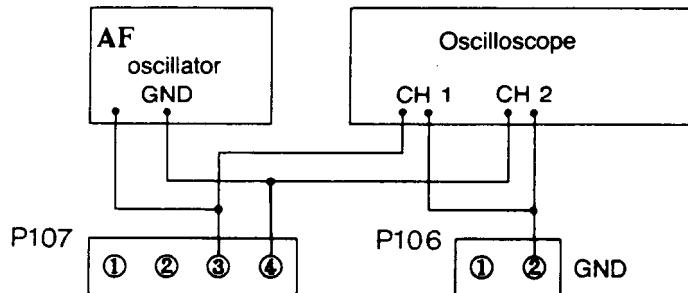
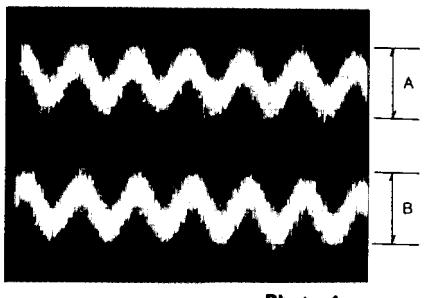
After adjustment, disconnect the AF oscillator and the oscilloscope.

## 6. Tracking gain adjustment

Set the output of AF oscillator to 1.2kHz, 1~1.5Vp-p.

Play the track 2 of test disc.

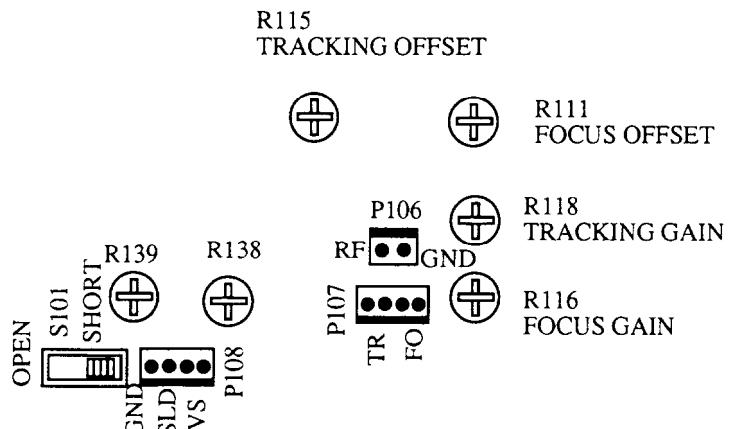
Connect the oscilloscope and the AF oscillator as shown below.



Adjust R118 until 1.2kHz components of channels 1 and 2 on oscilloscope become same level.

After adjustment, disconnect the AF oscillator and the oscilloscope.

After adjustment, confirm that the center of tracking error signal becomes GND level.



# PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

## DISPLAY CIRCUIT PC BOARD

### HEADPHONE TERMINAL PC BOARD (NAAF-4750-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
L601	230906	BL02RN2-R62,Coil
C607,C608	3030002	DSS3306-55B-101M,Filter
P601	25045221	HLJ0540-01-410,Jack

### RECTIFIER CIRCUIT PC BOARD (NAPS-4751-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	IC	

Q901	222780122	78M12
	Diodes	

D901,D903	22380048	RBA-402
D902	22380039	1D4B42

D910	223163 or	ISS133 or
	223205	ISS270A

D911	22380032 or	1SR139-100 or
	22380035	GP104003E

	Capacitors	
C901-C903	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
C907-C909	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
C913	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
C916	393380107	1 $\mu$ F,50V,Elect.

C917	393152227	2200 $\mu$ F,25V,Elect.
C918,C919	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic

C920	393141027	1000 $\mu$ F,16V,Elect.
C921,C922	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic

C923,C924	393154727	4700 $\mu$ F,25V,Elect.
C925,C926	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic

C927,C928	393154727	4700 $\mu$ F,25V,Elect.
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### POWER SWITCH PC BOARD (NASW-4752-1/1A)

CIRCUIT NO.	PART NO.	DESCRIPTION
L801,L802	231051	△ NCH-1092,Coil
C850	3500065A	△ DE7150FZ103PAC400V/125V, IS capacitor
	27301216	△ Cover for C850

C851,C852	3500077	△ DE5150F472M,Plastic capacitor
S901	25035636	△ NPS-111-L590P,Switch
F901	252075	△ 2.5A-SE-EAK,Fuse <P>

F901a	25050065	△ YSH403T,Fusholder <P>
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### DIMMER SWITCH PC BOARD (NASW-4753-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
S751	25030367	NRSF-123-30SRBM,Switch

### REMOTE CONTROL SENSOR PC BOARD (NAETC-4754-1)

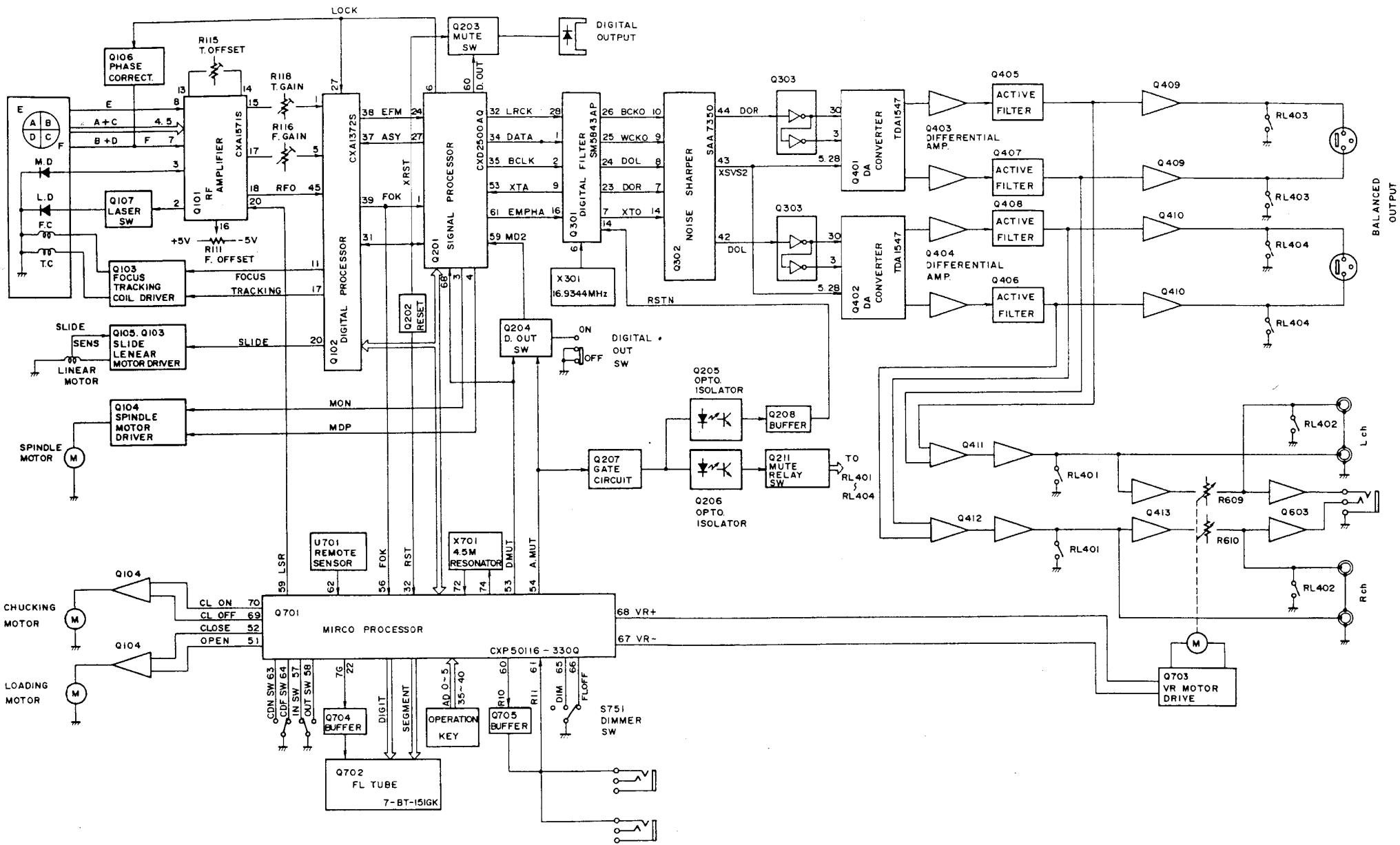
CIRCUIT NO.	PART NO.	DESCRIPTION
U701	24130003	GPIU50XS,Remote sensor

C716	393144707	47 $\mu$ F,16V,Elect. capacitor
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NOTE: <P>:230V model only

NOTE: THE COMPONENTS IDENTIFIED BY MARK △ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PART NUMBER SPECIFIED.

## BLOCK DIAGRAM



# PRINTED CIRCUIT BOARD – PARTS LIST

MAIN CIRCUIT PC BOARD (NAAR-4744-1)			CIRCUIT NO.	PART NO.	DESCRIPTION
CIRCUIT NO.	PART NO.	DESCRIPTION			
	ICs			Capacitors	
Q201	22240487 or 22240487A	CXD2500AQ or CXD2500BQ	C421-C424 C425-C432 C437-C440	374721024 373302214 393121027	1000pF±5%,50V,Plastic 220pF±5%,125V,Plastic 1000 μ F,6.3V,Elect.
Q202	22240018	M51943A	C451-C454	374722734	0.027 μ F±5%,50V,Plastic
Q205,Q206	24120012	PC713V	C455-C458	393144717	470 μ F,16V,Elect.
Q212	24120031	TOTX178	C459,C460	393142227	2200 μ F,16V,Elect.
Q301	22240680A	SM5843AP-ONK	C461,C462	393024717	470 μ F,6.3V,Elect.
Q302	22240655	SAA7350AGP	C463-C466	373301014	100pF±5%,125V,Plastic
Q303	222755	74HCU04P	C467-C470	374721034	0.01 μ F±5%,50V,Plastic
Q401,Q402	22240654	TDA1547	C471-C474	374721524	1500pF±5%,50V,Plastic
Q403-Q413	22240656	NE5532AN	C475-C478	373302214	220pF±5%,125V,Plastic
	Transistors		C479-C482	374721524	1500pF±5%,50V,Plastic
Q203	2214895 or 2214905	2SA1266-GR or 2PA1015-GR	C483-C490 C491-C494	373302214 374723924	220pF±5%,125V,Plastic 3900pF±5%,50V,Plastic
Q204,Q209	2213090 or 2213590	DTA114YS or RN2207	C495-C498 C499,C500	373722254 3030002	2.2 μ F±5%,50V,Plastic DSS306-55B-101M,Filter
Q207	221281 or 2213570	DTC114YS or RN1207	C501,C502 C551,C552	373301014 374721524	100pF±5%,125V,Plastic 1500pF±5%,50V,Plastic
Q208	2214885 or 2214915	2SC3198-GR or 2PC1815-GR	C553-C556 C557,C558	373302214 374723924	220pF±5%,125V,Plastic 3900pF±5%,50V,Plastic
Q210	2211945	2SK246-GR	C559,C560	373722254	2.2 μ F±5%,50V,Plastic
Q211	2201285	2SD882-Q	C561-C564	373301014	100pF±5%,125V,Plastic
	Diodes		C565,C566	393144727	4700 μ F,16V,Elect.
D201-D207	223163 or	1SS133 or		Switch	
D301-D303	223205	1SS270A	S201	25065286	NSS-22112
	Coils			Sockets	
L201,L202	233411K220	NCH-1387	P201,P202	25050969 or 25050861	NSCT-29P756 or NSCT-29P656
L301-L303	233411K220	NCH-1387		Terminals	
	Relaies				
RL401,RL402	25065469	NRL-2P1A-DC12-078	P203	25045172	HSJ-1003-01-020
	Resonator		P401	25045351	NPJ-4PDWR197
X301	3010189	DOC-80S		Plugs	
	Capacitors		P402	25055410	NPLG-8P392
C201,C210	393122217	220 μ F,6.3V,Elect.	P405	25055150	NPLG-6P134
C202,C209	374722734	0.027 μ F±5%,50V,Plastic	P905	25055155	NPLG-11P139
C204,C205	374721034	0.01 μ F±5%,50V,Plastic		Wire traps	
C206,C214	374724734	0.047 μ F±5%,50V,Plastic	P903	25050531	NSCT-9P354
C207	374721524	1500pF±5%,50V,Plastic	P904	25050525	NSCT-3P348
C211,C224	374721024	1000pF±5%,50V,Plastic			
C219	393144707	47 μ F,16V,Elect.		DIGITAL CIRCUIT PC BOARD (NADG-4745-1/1A)	
C220,C221	3030002	DSS306-55B-101M,Filter	CIRCUIT NO.	PART NO.	DESCRIPTION
C301,C305	374722734	0.027 μ F±5%,50V,Plastic		ICs	
C302,C306	393122217	220 μ F,6.3V,Elect.	Q101	22240404	CXA1571S
C308,C310	374722734	0.027 μ F±5%,50V,Plastic	Q102	22240366	CXA1372S
C309,C315	393122217	220 μ F,6.3V,Elect.	Q103,Q104	22240620	LA6520
C311,C313	393121027	1000 μ F,6.3V,Elect.	Q105	222090	S2FR04
C312,C314	374722734	0.027 μ F±5%,50V,Plastic	Q801	222780055MIT	M5F78M05
C401,C402	393344707	47 μ F,16V,Elect.	Q802	222790053	79L05
C405-C416	393344707	47 μ F,16V,Elect.	Q803	222780052	78M05
C417-C420	393022217	220 μ F,6.3V,Elect.	Q804	22240390	M5293L

NOTE: THE COMPONENTS IDENTIFIED BY MARK  $\Delta$   
ARE CRITICAL FOR RISK OF FIRE AND  
ELECTRIC SHOCK. REPLACE ONLY WITH  
PART NUMBER SPECIFIED.

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	Transistors			Capacitors	
Q106,Q806	221281 or 2213570	DTC114YS or RN1207	C160,C161	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
Q107,Q109	2211503 or 2211504	2SA950-O or 2SA950-Y	C162	374721024	1000pF $\pm$ 5%,50V,Plastic
Q108	2211163 or 2211164	2SC2120-O or 2SC2120-Y	C163	374721034	0.01 $\mu$ F $\pm$ 5%,50V,Plastic
Q805	2213090 or 2213590	DTA114YS or RN2207	C165-C168	393144707	47 $\mu$ F,16V,Elect.
Q807,Q808	2213063 or 2213064	2SD1227M-Q or 2SD1227M-R	C169,C170	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
	Diodes		C172	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
D101	223163 or	ISS133 or	C801-C803	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
D103-D106	223205	ISS270A	C809-C811	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic
D107,D108	224451102	MTZ11B	C817,C818	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
D801,D802	22380039	1D4B42	C819	393144717	470 $\mu$ F,16V,Elect.
D803,D804	223163 or	ISS133 or	C820	393142227	2200 $\mu$ F,16V,Elect.
D806	223205	ISS270A	C821,C822	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
L101	231023	NCH-1062	C823,C824	393121027	1000 $\mu$ F,6.3V,Elect.
L102-L105	233411K220	NCH-1387	C825,C826	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
L801	233411K220	NCH-1387	C827,C828	393152227	2200 $\mu$ F,25V,Elect.
C101,C102	393122217	220 $\mu$ F,6.3V,Elect.	C831	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
C103,C131	374724724	4700pF $\pm$ 5%,50V,Plastic	C832	393121027	1000 $\mu$ F,6.3V,Elect.
C110	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic	C834,C836	393384707	47 $\mu$ F,50V,Elect.
C111	374724734	0.047 $\mu$ F $\pm$ 5%,50V,Plastic	C837	393381097	0.1 $\mu$ F,50V,Elect.
C112,C126	374721034	0.01 $\mu$ F $\pm$ 5%,50V,Plastic		Resistors	
C113	374726824	6800pF $\pm$ 5%,50V,Plastic	R111	5210060	N06HR2.2KBD,Trim
C114-C116	374721044	0.1 $\mu$ F $\pm$ 5%,50V,Plastic	R115,R116	5210066	N06HR22KBD,Trim
C117	374722224	2200pF $\pm$ 5%,50V,Plastic	R118	5210066	N06HR22KBD,Trim
C118	393381007	10 $\mu$ F,50V,Elect.	R138	5210064	N06HR10KBD,Trim
C119,C150	374723334	0.033 $\mu$ F $\pm$ 5%,50V,Plastic	R139	5210001	N06HR100BD,Trim
C120	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic	R812	442621804	18 ohm,1W,Metal oxide
C121,C135	393122217	220 $\mu$ F,6.3V,Elect.	P101	25050969 or 25050861	Sockets NSCT-29P756 or NSCT-29P656
C122	374726834	0.068 $\mu$ F $\pm$ 5%,50V,Plastic		Plugs	
C123	393380227	2.2 $\mu$ F,50V,Elect.	P102	25055139	NPLG-9P123
C124	393380107	1 $\mu$ F,50V,Elect.	P103	25055151	NPLG-7P135
C125	393363307	33 $\mu$ F,35V,Elect.	P104	25055150	NPLG-6P134
C129,C134	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic	P105	25055149	NPLG-5P133
C130	374722234	0.022 $\mu$ F $\pm$ 5%,50V,Plastic	P106	25055038	NPLG-2P29
C132,C133	<u>374721034</u>	0.01 $\mu$ F $\pm$ 5%,50V,Plastic	P107,P108	25055045	NPLG-4P33
C138,C139	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic		Switch	
C140,C141	393122217	220 $\mu$ F,6.3V,Elect.	S101	250650364	NSS-12138
C144,C145	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic		IC protectors	
C146,C147	393122217	220 $\mu$ F,6.3V,Elect.	QF101,QF102	252112	$\Delta$ ICP-N15-0.6A (Except 120V model)
C148,C149	374721034	0.01 $\mu$ F $\pm$ 5%,50V,Plastic		OUTPUT TERMINAL PC BOARD (NAAF-4746-1)	
C151,C152	393144707	47 $\mu$ F,16V,Elect.	CIRCUIT NO.	PART NO.	DESCRIPTION
C153,C154	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic	D401	223163 or 223205	ISS133 or ISS270A,Diode
C155-C157	374721034	0.01 $\mu$ F $\pm$ 5%,50V,Plastic	RL403,RL404	25065469	NRL-2P1A-DC12-078,Relay
C158,C159	393164707	47 $\mu$ F,35V,Elect.	C505-C508	373301014	100pF $\pm$ 5%,125V,Plastic capacitor
			P402A	25050676	NSCT-8P480,Socket
			P403,P404	25050776	NSCT-3P571,Socket

REGULATOR CIRCUIT PC BOARD (NAPS-4747-1)			CIRCUIT NO.	PART NO.	DESCRIPTION
CIRCUIT NO.	PART NO.	DESCRIPTION			
	ICs		Q704	2212132 or 2212133	2SC2021-R or 2SC2120-S
Q902	222780055MIT	M5F78M05	Q705	2213183 or 2213184	2SA937-Q or 2SA937-R
Q919,Q920	222811	NJM4558D-D			
	Transistors				
Q903	2201285	2SD882-Q			Diodes
Q904	2201275	2SB772-Q	D701	22380032 or 22380035	1SR139-100 or GP104003E
Q905,Q909	2214885 or	2SC3198-GR or			
Q913,Q917	2214915	2PC1815-GR	D702,D705	223163 or 223205	1SS133 or 1SS270A
Q906,Q910	2214895 or	2SA1266-GR or			
Q914,Q918	2214905	2PA1015-GR	D703	224450623	MTZ6.2C
Q907,Q908	2211945	2SK246-GR	D704	224450562	MTZ5.6B
Q911	2201285	2SD882-Q			Coils
Q912	2201275	2SB772-Q	L701-L704	233411K220	NCH-1387
Q915,Q916	2211945	2SK246-GR			
	Diodes		X701	3010188	CST4.50MGW,Ceramic
D912	223163 or 223205	ISS133 or ISS270A	C702	393384707	47 $\mu$ F,50V,Elect.
D913,D914	225251	TLR112,LED	C703,C707	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
D915,D916	224450512	MTZ5.1B	C706	393122217	220 $\mu$ F,6.3V,Elect.
	Capacitors				
C931	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic	R717	49163472406	4.7kohm $\times$ 6,1/10W,Array
C932	393121027	1000 $\mu$ F,6.3V,Elect.			
C933-C936	374722234	0.022 $\mu$ F $\pm$ 5%,50V,Plastic	S701-S723	25035548	NPS-111-S510
C937,C938	374722224	2200pF $\pm$ 5%,50V,Plastic			
C939,C940	393341007	10 $\mu$ F,16V,Elect.	P701	25050969 or 25050861	NSCT-29P756 or NSCT-29P656
C941,C942	393321017	100 $\mu$ F,6.3V,Elect.			
C943,C944	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic	P702A	20012391410	NSAS-14P0221
C945,C946	393122227	2200 $\mu$ F,6.3V,Elect.			
C947-C950	374721034	0.01 $\mu$ F $\pm$ 5%,50V,Plastic			
C951,C952	374721024	1000pF $\pm$ 5%,50V,Plastic			
C953,C954	393341007	10 $\mu$ F,16V,Elect.			
C955,C956	393321017	100 $\mu$ F,6.3V,Elect.			
C957,C958	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic			
C959,C960	393142227	2200 $\mu$ F,16V,Elect.	Q603	222654	NJM4556D
	Resistors				
R905,R906	452534794	0.47ohm,1/2W,Metal	Q601	2211163 or 2211164	2SC2120-O or 2SC2120-Y
R919,R920	452530224	2.2ohm,1/2W,Metal	Q602	2211503 or 2211504	2SA950-O or 2SA950-Y
P905A	2002342215	NSAS-22P0214			
	Capacitors				
DISPLAY CIRCUIT PC BOARD (NADIS-4748-1)			C601,C602	374722734	0.027 $\mu$ F $\pm$ 5%,50V,Plastic
CIRCUIT NO.	PART NO.	DESCRIPTION	C603,C604	393154717	470 $\mu$ F,25V,Elect.
	ICs				
Q701	22240521	CXP50116-330Q	R601,R602	442522214	220ohm,1/2W,Metal oxide film
Q703	22240322	LB1639	R609,R610	5142010	N16RGM20KB30F,Variable
	FL tube				
Q702	212101	7-BT-151GK	P405A	2009990191	NSAS-12P0257
	Plug		P702	25055151	NPLG-7P135